

**WEST VIRGINIA**  
**SECRETARY OF STATE**  
**KEN HECHLER**  
**ADMINISTRATIVE LAW DIVISION**

Form #3

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OFFICE OF THE SECRETARY OF STATE  
STATE OF WEST VIRGINIA

**NOTICE OF AGENCY APPROVAL OF A PROPOSED RULE  
AND  
FILING WITH THE LEGISLATIVE RULE-MAKING REVIEW COMMITTEE**

AGENCY: Agriculture TITLE NUMBER: 61

CITE AUTHORITY Chapter 19-15A

AMENDMENT TO AN EXISTING RULE: YES  NO

IF YES, SERIES NUMBER OF RULE BEING AMENDED: VI a

TITLE OF RULE BEING AMENDED: West Virginia Agricultural Liming  
Materials Regulations

IF NO, SERIES NUMBER OF NEW RULE BEING PROPOSED: \_\_\_\_\_

TITLE OF RULE BEING PROPOSED: \_\_\_\_\_

THE ABOVE PROPOSED LEGISLATIVE RULE HAVING GONE TO A PUBLIC HEARING OR A PUBLIC COMMENT PERIOD IS HEREBY APPROVED BY THE PROMULGATING AGENCY FOR FILING WITH THE SECRETARY OF STATE AND THE LEGISLATIVE RULE MAKING REVIEW COMMITTEE FOR THEIR REVIEW.



CIRCUMSTANCES REQUIRING THE AMENDMENTS TO THE  
WEST VIRGINIA AGRICULTURAL LIMING MATERIALS REGULATIONS

The regulations are amended subsequent to the amendment of the West Virginia Agricultural Liming Materials Law, Chapter 19, Article 15A signed into law March 5, 1990 and effective June 3, 1990.

The Department has proposed several changes to the calcium carbonate equivalent minimums and the sieve size standards in order to be more in line with industry standards.

In addition the Department feels that a designation of "Low-grade liming materials" is more descriptive than "Sub-standard liming materials" and is proposing this change.

## SUMMARY

### PROPOSED AMENDMENT TO AN EXISTING RULE

#### WEST VIRGINIA AGRICULTURAL LIMING MATERIALS

The proposed rule is an amendment to the existing rule. The proposed rule clarifies language for fineness classifications and blends of liming materials. The amendment adopts the minimum calcium carbonate equivalents set by the American Plant Food Control Officials and changes the sieve size used for ground and coarse ground fineness classifications from a 50 mesh to a 60 mesh sieve.

The proposed rule removes language regarding penalties, deficiencies and tolerances as these areas were incorporated into section 19-15A-7 of the law, Deficiency assessment, tolerances and payment.

"Sub-standard liming materials" will now be called "Low-grade liming materials". The registration of these products is at the discretion of the Commissioner. He will consider only the value of the product as an agricultural liming material when making his decision to register.

The proposed rule requires labels to be submitted with applications for registration. Any change in the label or guarantee from that on file will be considered a new registration.

The proposed rule eliminates out-dated language.

BJS/sumlim

APPENDIX B

FISCAL NOTE FOR PROPOSED RULES

Rule Title: West Virginia Agricultural Lining Materials Regulations

Type of Rule: X Legislative          Interpretive          Procedural

Agency WV Department of Agriculture Address Charleston, WV

1. Effect of Proposed Rule:	ANNUAL		FISCAL YEAR		
	Increase	Decrease	Current	Next	Thereafter
Estimated Total Cost	\$ 0	\$ 0	\$ 0	\$ 0	\$ 0
Personal Services	0	0	0	0	0
Current Expense	0	0	0	0	0
Repairs and Alterations	0	0	0	0	0
Equipment	0	0	0	0	0
Other	0	0	0	0	0

2. Explanation of above estimates:

The changes in this rule provide for changes in minimum standards, labeling changes and will clarify definitions of blends. The state will incur no charges for these changes in the rule.

3. Objectives of these rules:

The objective of this rule is to bring the provisions into compliance with recent amendments to the law, to set different minimum standards for calcium carbonate equivalents and sieve sizes and to clarify labeling and registration procedures.

4. Explanation of Overall Economic Impact of Proposed Rule.

A. Economic Impact on State Government.

None

B. Economic Impact on Political Subdivisions; Specific Industries; Specific groups of citizens.


The economic impact on the industry will involve changing product labels to reflect changes in the minimum standards and a change from "Sub-Standard Liming Materials" to "Low-Grade Liming Material".

C. Economic Impact on Citizens/Public at Large.

None

Date: July 5, 1990

Signature of Agency Head or Authorized Representative

  
\_\_\_\_\_

DATE: August 10, 1990  
TO: LEGISLATIVE RULE-MAKING REVIEW COMMITTEE  
FROM: Barbara J. Smith, Director of Compliance WV Dept. of Agriculture  
LEGISLATIVE RULE TITLE: West Virginia Agricultural Liming Material  
Regulations  
1. Authorizing statute(s) citation Chapter 19-15A

2. a. Date filed in State Register with Notice of Hearing:  
July 9, 1990
- b. What other notice, including advertising, did you give of the hearing?  
Sent a copy of the proposal to all current registrants the USDA-SCS, USDA-PRS, USDA-ASCS, the University Extension Service and the National Stone Association.
- c. Date of hearing (s): August 9, 1990
- d. Attach list of persons who appeared at hearing, comment received, amendments, reasons for amendments.  
Attached X No comments received
- e. Date you filed in State Register the agency approved proposed Legislative Rule following public hearing:  
(be exact)  
August 10, 1990
- f. Name and phone number of agency person to contact for additional information:  
Barbara J. Smith, Director of Compliance 348-2226

3. If the statute under which you promulgated the submitted rules requires certain findings and determinations to be made as a condition precedent to their promulgation:

a. Give the date upon which you filed in the State Register a notice of the time and place of a hearing for the taking of evidence and a general description of the issues to be decided.

July 9, 1990

b. Date of hearing: August 9, 1990

c. On what date did you file in the State Register the findings and determinations required together with the reasons therefor?

August 10, 1990

d. Attach findings and determinations and reasons:

Attached X

WEST VIRGINIA LEGISLATIVE REGULATIONS  
STATE DEPARTMENT OF AGRICULTURE  
Chapter 19-15A  
Series VIa

TITLE: West Virginia Agricultural Liming Materials Law  
Regulations

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Section 1. General

1.1 Scope - These regulations establish values for neutralizing qualities and fineness, define deficiencies and establish tolerances, set standards for neutralizing qualities and fineness and establish methods for assessing penalties. These are Legislative regulations.

1.2 Authority - Code of West Virginia, 19-15A.

1.3 Filing Date; ~~June-27-1975~~

1.4 Effective Date; ~~July-27-1976~~

1.5 These regulations amend the previous regulations dated July 1, 1976 to comply with legislation passed on March 5, 1990 and to meet industry standards.

Section 2. Index

Section 1. General

Section 2. Index

Section 3. Administrative Calcium Carbonate Equivalent Standards

Section 4. Penalties-Values-for-Neutralizing-Qualities-Sieve Size-Guarantees. Fineness Classification Standards

Section 5. Deficiencies-and-Tolerances Blends

Section 6. Minimum-Calcium-Carbonate-Equivalents Low-grade Agricultural Liming Materials

Section 7. Minimum-Sieve-Size-Standards Labels

Section 8. Blends Registration

~~Section-9. Supersedeure~~

~~Section-3.- Administrative~~

~~3.1--By authority vested in the Commissioner of Agriculture by Chapter 29, Article 15A, Code of West Virginia, as amended and following public hearing of March 16, 1976, I, Gus R. Bouglass, do hereby prescribe and adopt the following regulations relating to the distribution and sale of Agricultural Liming Materials in the State of West Virginia:~~

~~Section-4.- Penalties-Values-for-Neutralizing-Qualities-and-Sieve Size-Guarantees.~~

~~7-1-1-2~~ 4.1.a.B 70% passing a US Standard 100  
Mesh Sieve

~~7-1-2~~ 4.1.b Ground Limestone

~~7-1-2-1~~ 4.1.b.A 90% Passing a US Standard 20  
Mesh Sieve

~~7-1-2-2~~ 4.1.b.B 50% Passing a US Standard 50 60  
Mesh Sieve

~~7-1-2-3~~ 4.1.b.C 35% Passing a US Standard 100  
Mesh Sieve Sieve

~~7-1-3~~ 4.1.c Coarse Ground Limestone-~~or-By-Product~~  
lime

~~7-1-3-1~~ 4.1.c.A 90% Passing a US Standard 10  
Mesh Sieve Sieve

~~7-1-3-2~~ 4.1.c.B 40% Passing a US Standard 50 60  
Mesh Sieve Sieve

## Section 8 5. Blends

5.1 Blends are products containing a mixture of different agricultural liming materials or containing a component of agricultural liming material and fertilizer, seed, and/or inert material.

~~8-1~~ 5.2 Blends of Agricultural-Liming-Materials  
agricultural liming materials will be permitted, however,  
percentage components of the materials used must be shown on the  
label in relative proximity to the guaranteed analysis.  
considered as products requiring separate registration under  
their own brand name.

~~8-2~~ The Commissioner may accept registration of locally  
produced materials having soil neutralizing capability to meet  
special local needs. Such materials shall be labeled to show its  
common name, calcium and magnesium oxide or carbonate, calcium  
carbonate equivalent and the actual sieve size specifications as  
referenced in Section 7.1.2. Such material shall also be  
prominently labeled, invoiced or identified as "SUB-STANDARD  
LIMING MATERIALS" next following the common name.

5.3 Any blend claiming to have a component of agricultural  
liming material shall comply with the law and regulations.

5.3.a Any blend shall be labeled as to the total  
percentage of agricultural liming materials in addition to the  
labeling requirements of the law set forth in section 19-15A-3.

Section 9. Supersedeure

~~4.1--The values for neutralizing qualities and sieve size guarantees of Agricultural Liming Materials shall be based on the registrants established delivery price at the quarry or if an out-of-state registrant, his distribution point within this State.~~

~~4.2--Penalties shall be computed by multiplying the deficiency exceeding the tolerance, by times three, times the delivery price, times the volume of the lot.~~

### Section 5-- Deficiencies and Tolerances

~~5.1--For administrative purposes and to allow for possible bias in sampling and analysis, an Agricultural Liming Material shall be considered as deficient and subject to penalty when:~~

~~5.1.1--The calcium carbonate equivalent falls more than five (5) percent below its guarantee.~~

~~5.1.2 The amount of material which passes through any sieve is more than five (5) percent below the percentage guarantee for that sieve size.~~

### Section 6-- Minimum Calcium Carbonate Equivalents Section 3. Calcium Carbonate Equivalent Standards

~~6.1 3.1 The minimum calcium carbonate equivalent standards shall be:~~ for the following types of agricultural liming materials shall be: for

~~6.1.1 3.1.a~~ 3.1.a Burnt Lime: Not less than 140%

~~6.1.2 3.1.b~~ 3.1.b Hydrated Lime: Not less than 110%

~~6.1.3 3.1.c~~ 3.1.c Marl: Not less than 85% 80%

~~6.1.4 3.1.d~~ 3.1.d Limestone: Not less than 85%

~~6.1.5 3.1.e~~ 3.1.e Slag: Not less than 85%

~~6.1.6 3.1.f~~ 3.1.f Shells: Not less than 85% 80%

### Section 7-- Minimum Sieve Size Standards Section 4. Fineness Classification Standards

~~7.1 4.1 The minimum sieve size standards for Agricultural Liming Materials~~ agricultural liming materials shall be, for :

~~7.1.1 4.1.a~~ 4.1.a Pulverized Limestone

~~7.1.1.1 4.1.a.A~~ 4.1.a.A 100% passing a US Standard 20 Mesh Sieve

~~9.1---The foregoing regulations supersede all previous regulations heretofore issued.---The Commissioner reserves the right to rescind, suspend or amend any regulation, standard or value herein set forth.~~

## Section 6. Low-grade Agricultural Liming Materials

6.1 Low-grade liming materials are agricultural liming materials that do not meet the standards set in 3.1 and/or 4.1 of these regulations but still have value as a product to neutralize soil acidity.

6.2 The Commissioner may accept registration of agricultural liming materials that do not meet the minimum calcium carbonate equivalent and/or minimum fineness classification standards set by Section 3 and 4 of these regulations. The Commissioner shall consider the chemical and fineness components of the low-grade agricultural liming material when reviewing the application for registration.

6.3 Labels of low-grade agricultural liming materials shall meet all the requirements of the law and shall include the following additional statements:

6.3.a The words "Low-grade Liming Material" placed prominently at the top of the label.

6.3.b The words "Does not meet the minimum standard for calcium carbonate equivalent" if this is true.

6.3.c The words "Does not meet the minimum standard for fineness classification" if this is true.

6.4 If the low-grade agricultural liming material does not meet the minimum fineness classification for coarse ground, then the fineness classification shall be designated as "Very coarse ground".

## Section 7. Labels

7.1 Labels of all agricultural liming materials shall accompany the application for registration.

7.2 No registration shall be accepted if the label for the agricultural liming material conflicts with the information on the application for registration.

7.3 No agricultural liming materials shall be used, sold, or offered for sale if the label differs in any respect from the label submitted with the application for registration.

## Section 8. Registration

8.1 Any changes permitted in the guaranteed analysis for calcium carbonate equivalent or fineness classification for a registered product shall be considered a new registration.

WEST VIRGINIA LEGISLATIVE REGULATIONS  
STATE DEPARTMENT OF AGRICULTURE  
Chapter 19-15A  
Series VIa

TITLE: West Virginia Agricultural Liming Materials Law  
Regulations

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Section 2. Index

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Section 4. Fineness Classification Standards

Section 5. Blends

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Section 8. Registration

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3.1.a Burnt Lime: Not less than 140%

3.1.b Hydrated Lime: Not less than 110%

3.1.c Marl: Not less than 80%

3.1.d Limestone: Not less than 85%

3.1.e Slag: Not less than 85%

3.1.f Shells: Not less than 80%

#### Section 4. Fineness Classification Standards

4.1 The minimum sieve size standards for agricultural liming materials shall be:

##### 4.1.a Pulverized

4.1.a.A 100% passing a US Standard 20 Mesh Sieve

4.1.a.B 70% passing a US Standard 100 Mesh Sieve

##### 4.1.b Ground

4.1.b.A 90% Passing a US Standard 20 Mesh Sieve

4.1.b.B 50% Passing a US Standard 60 Mesh Sieve

4.1.b.C 35% Passing a US Standard 100 Mesh Sieve

##### 4.1.c Coarse Ground

4.1.c.A 90% Passing a US Standard 10 Mesh Sieve

4.1.c.B 40% Passing a US Standard 60 Mesh Sieve

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5.1 Blends are products containing a mixture of different agricultural liming materials or containing a component of agricultural liming material and fertilizer, seed, and/or inert material.

5.2 Blends of agricultural liming materials will be considered as products requiring separate registration under their own brand name.

5.3 Any blend claiming to have a component of agricultural liming material shall comply with the law and regulations.

5.3.a Any blend shall be labeled as to the total percentage of agricultural liming materials in addition to the labeling requirements of the law set forth in section 19-15A-3.

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*Rule being amended  
(currently in effect)*

WEST VIRGINIA LEGISLATIVE REGULATIONS  
STATE DEPARTMENT OF AGRICULTURE  
Chapter 19-15A  
SERIES VIa

TITLE: West Virginia Agricultural Liming Materials Law Regulations

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1.1 Scope - These regulations establish values for neutralizing qualities and fineness, define deficiencies and establish tolerances, set standards for neutralizing qualities and fineness and establish methods for assessing penalties. These are Legislative regulations.

1.2 Authority - Code of West Virginia, 19-15A.

1.3 Filing Date; June 2, 1975.

1.4 Effective Date; July 1, 1976.

Section 2. Index

- Section 1.
- Section 2.
- Section 3.
- Section 4.

ities and Sieve

- Section 5.
- Section 6.
- Section 7.
- Section 8.
- Section 9.

nts

*No  
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Section 3. Administrative

3.1 By authority vested in me by Chapter 19, Article 15A, Code of West Virginia, as amended and following public hearing of March 16, 1976, I, Gus R. Douglass, do hereby prescribe and adopt the following regulations relating to the distribution and sale of Agricultural Liming Materials in the State of West Virginia.

Section 4. Penalties Values for Neutralizing Qualities and Sieve Size Guarantees

4.1 The values for neutralizing qualities and sieve size guarantees of Agricultural Liming Materials shall be based on the registrants established delivery price at the quarry or if an out-of-state registrant, his distribution point within this State.

4.2 Penalties shall be computed by multiplying the deficiency exceeding

the tolerance, by times three, times the delivery price, times the volume of the lot.

#### Section 5. Deficiencies and Tolerances

5.1 For administrative purposes and to allow for possible bias in sampling and analysis, an Agricultural Liming Material shall be considered as deficient and subject to penalty when:

- 5.1.1 The calcium carbonate equivalent falls more than five (5) percent below its guarantee.
- 5.1.2 The amount of material which passes through any sieve is more than five (5) percent below the percentage guarantee for that sieve size.

#### Section 6. Minimum Calcium Carbonate Equivalents

6.1 The minimum calcium carbonate equivalent standards shall be: for

- 6.1.1 Burnt Lime: Not less than 140%
- 6.1.2 Hydrated Lime: Not less than 110%
- 6.1.3 Marl: Not less than 85%
- 6.1.4 Limestone: Not less than 85%
- 6.1.5 Slag: Not less than 85%
- 6.1.6 Shells: Not less than 85%

#### Section 7. Minimum Sieve Size Standards

7.1 The minimum sieve size standards for Agricultural Liming Materials shall be; for

- 7.1.1 Pulverized Limestone
  - 7.1.1.1 100% passing a US Standard 20 Mesh Sieve
  - 7.1.1.2 70% Passing a US Standard 100 Mesh Sieve
- 7.1.2 Ground Limestone
  - 7.1.2.1 90% Passing a US Standard 20 Mesh Sieve
  - 7.1.2.2 50% Passing a US Standard 50 Mesh Sieve

7.1.2.3 35% Passing a US Standard 100 Mesh Sieve

7.1.3 Coarse Ground Limestone or By-Product Lime

7.1.3.1 90% Passing a US Standard 10 Mesh Sieve

7.1.3.2 40% Passing a US Standard 50 Mesh Sieve

### Section 8. Blends

8.1 Blends of Agricultural Liming Materials will be permitted; however, percentage components of the materials used must be shown on the label in relative proximity to the guaranteed analysis.

8.2 The Commissioner may accept registration of locally produced materials having soil neutralizing capability to meet special local needs. Such materials shall be labeled to show its common name, calcium and magnesium oxide or carbonate, calcium carbonate equivalent and the actual sieve size specifications as referenced in Section 7.1.2. Such material shall also be prominently labeled, invoiced or identified as "SUB-STANDARD LIMING MATERIALS" next following the common name.

### Section 9. Supersedure

9.1 The foregoing regulations supersede all previous regulations heretofore issued. The Commissioner reserves the right to rescind, suspend or amend any regulation, standard or value herein set forth.

---

Gus R. Douglass  
Agriculture Commissioner



AUG 0 9 1990

Memorandum

To: Commissioner Benedict  
Barbara Smith

From: Brenda Nichols Harper *BNA*

Date: 8-8-90

RE: Phone comments on the W. Va. Liming Materials Regs.

Today, Mr. Don Horvath of Morgantown, W. Va. who represented that he is associated with the Agriculture School phoned to make oral comments on the W.VA. Liming Materials Regulations.

He stated that W.VA. farmers largest problem is highly acidic soil. He believes the regulations are on the right track on the 60 mesh size and is a desirable addition to the industry. However, he believes that downgrading the neutralizing equivalent from 85% to 80% will not be good for the W. Va. farmer.

These comments were received by me this date at 1:20 p.m.



College of Agriculture and Forestry

 Division of Plant and Soil Sciences  
 P.O. Box 6108  
 Morgantown, WV 26506-6108  
 FAX 304 293-3740

Attn. Barbara Smith  
 Compliance Division  
 WV Dept of Agriculture  
 Charleston

## MEMORANDUM

TO: Cleve Benedict  
 Agricultural Commissioner

FROM: William B. Bryan *WBB*

DATE: August 8, 1990

RE: Revised Lime Law Regulations

I suggest that the purity standard for aglime be kept unchanged at 85%. The 85% standard assures a good quality product and there is a provision for marketing lower quality materials. Since much of the state is hilly, I believe agricultural interests are better served if transportation and application costs are kept as low as possible. Higher quality materials will have lower costs per CaCO<sub>3</sub> equivalent actually reaching the ground.

I support the use of 60 mesh sieve as a measurement of fineness because, again, the product will be higher in quality.

An even better idea would be to combine fineness of grind with purity so that all ground limestone could be evaluated by farmers on the basis of a single value.





1076 Agricultural Sciences Building  
P.O. Box 8108  
Morgantown, WV 26506-8108  
(304) 293-2219 or FAX 293-6954

August 8, 1990

MEMORANDUM

TO: WVDA  
ATTN: Barbara Smith

FROM: Willem van Eck *WJE*

RE: Aglime Law Regulations

- I welcome your change of sieve size to 60 mesh (4.1.b.B and 4.1.c.B) where it used to be.
- I urge you to leave calcium carbonate equivalent for standard ground and coarse ground aglime at 85 percent (3.1.d).
- I prefer that you combine the purity (CCB) and fineness standards into one figure for "Effective Calcium Carbonate Equivalent Index" as proposed by National Stone Institute. You would not need a lower limit for this as farmers would choose what suits their needs for the price they can afford.

WVE/vlw

**75**  
years

Helping you put knowledge to work

The West Virginia University Cooperative Extension Service, U.S. Department of Agriculture,  
and West Virginia Counties cooperating.

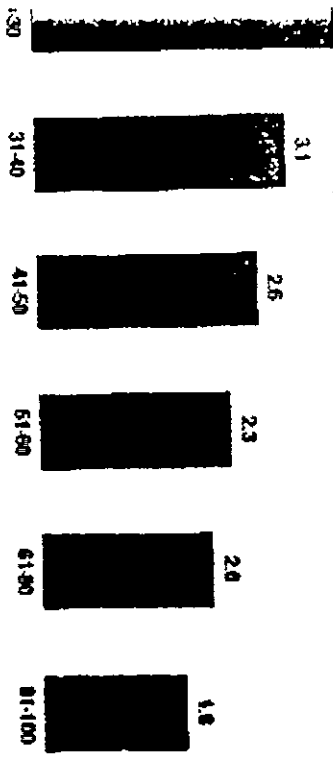
Equal Opportunity/Affirmative Action Institution

cases (particle size decreases), the amount of reactive surface area given quantity of aglime increases. For example, a piece of lime with a volume of one cubic inch has a surface area of approximately six square inches. That same piece of limestone ground to pass 40-mesh screen would have approximately 60,000 square inches of reactive area.<sup>22</sup> As fineness of grind and surface area increase, aglime is more likely to dissolve more rapidly and effect needed changes in soil pH over shorter period of time.

Figure 5-1

### RELATIONSHIP BETWEEN LIMESTONE FINENESS, RATE OF APPLICATION, AND CROP YIELD.

Tons Required for Equal Crop Response  
(Basis: 80 percent relative yield)



Limestone fineness—% passing through a 60-mesh sieve

Average of 16 field experiments, one to six years duration  
Stanley A. Barber, Purdue University

The interaction of particle size with the calcium carbonate equivalent is what determines the total effectiveness, or effective calcium carbonate equivalent, of a given lot of agricultural limestone. For example, one limestone with a 90 percent calcium carbonate equivalent and a 75 percent availability based on fineness will have a  $.90 \times .75 = .675$  or 67.5 percent ECCE. Another, with a calcium carbonate equivalent of

TABLE 5-2

#### Total Fineness Efficiency—How It Works

Step 1. Approximate weight % of limestone dissolved in several size fractions—1, 4, and 8 years after application to the soil.

Size fraction	Years after application			
	1	4	8	
Passing 60 mesh	100	100	100	100
30 to 60 mesh	50	100	100	100
8 to 30 mesh	20	45	75	75
Retained on 8 mesh	5	15	25	25

Step 2. Particle size analysis of aglime products from five typical mid-western quarries.

Size fraction	Quarry number				
	1	2	3	4	5
Passing 60 mesh	12.56	18.70	18.90	20.49	22.01
30 to 60 mesh	6.69	12.68	9.93	14.11	14.20
8 to 30 mesh	38.69	45.12	36.78	46.25	42.63
Retained on 8 mesh	42.06	23.50	34.39	19.15	21.15

Step 3. Calculation of fineness efficiency of aglime from Quarry 3.

Size fraction	Weight % ± 100	Efficiency factor	Fineness efficiency
Passing 60 mesh	0.189	100	18.90
30 to 60 mesh	0.099	50	4.95
8 to 30 mesh	0.3678	20	7.36
Retained on 8 mesh	0.3439	5	1.72
Total fineness efficiency			32.93

Efficiency factor is from 1-year values of Step 1.

limestones used in this example would contain 1350 lbs (2000 x .5), and 1224 lbs (2000 x .612) of effective calcium carbonate equivalent per ton. So even a minor change in the calcium carbonate content of limestone will drastically affect its neutralizing value. Magnesium content was discussed earlier in this chapter as a factor determining the effective calcium carbonate equivalent of agricultural limestone. It also influences aglime efficiency in other ways. The fact that dolomitic limestone contains magnesium as well as calcium gives it an agronomic advantage over straight calcitic limestone where legumes, especially alfalfa, are grown, or in soils that are low in magnesium. In the latter situation, greater yield increases may be possible with dolomitic rather than calcitic limestone is used.

**Which Type of Aglime Should the Farmer Apply?**

Agronomists agree that the main considerations when deciding whether to use calcitic or dolomitic limestone should be both economic and agronomic. The farmer should use the lowest cost material available on ECCE. Transportation is a major component in the cost of lime to the farmer, and it will become increasingly significant as the cost of fuel increases.

In most cases, with the exception of certain field situations, both types of limestone are about equal agronomically:

each contains sufficient calcium to meet both soil and crop needs or that nutrient.

Calcitic and dolomitic limestone are approximately equal in terms of their ability to neutralize soil acidity.

Dolomitic limestone can be applied to most soils with little or no risk of adverse effects from the addition of magnesium. Data from controlled research trials conducted throughout the midwest, where dolomitic-magnesium ratios were deliberately changed by applying dolomitic limestone, have shown no serious problem related to the nutrient balance between calcium and magnesium until these elements reached a soil ratio of 1:1 or more, or where magnesium might, in an unusual case, exceed calcium in soil concentration. The above applies to most medium-textured (clay-loam type, high in clay and organic matter) soils and permits the use of dolomitic limestone in any liming situations even though adequate soil magnesium already present.<sup>23,24,25</sup> However, although magnesium itself is not toxic to plants, very high soil magnesium levels may restrict plant uptake of other nutrients as calcium and potassium,<sup>22</sup> which can be a critical factor at high crop yield levels, especially on sandy or low CEC soils.

# How to Calculate the Aglime Recommendation

The correct rate of aglime application can be quickly calculated from the calcium carbonate equivalent recommendation given on the soil test report once the effective calcium carbonate equivalent of the limestone is known.

Assume that aglime in your area has an ECCE of 68 percent. In other words, it contains 1360 pounds of effective calcium carbonate equivalent (2000 x .68) per ton. The recommendation for the field to be treated calls for the application of 5500 pounds of calcium carbonate per acre (100% pure basis). To determine the tons of limestone needed to fulfill this recommendation, divide the recommended pounds of calcium carbonate equivalent by the pounds of ECCE per ton of aglime as follows:

$$\begin{aligned} \text{Recommendation} & \quad 5500 \text{ lbs/acre CaCO}_3 \\ \text{Aglime Required} & \quad 5500 \div 1360 \\ & = 4.04 \text{ tons per acre} \end{aligned}$$

## Adjust Aglime Rate for Depth of Incorporation

Most recommendations for agricultural limestone are customarily made on the basis of the rate required for incorporation to plow-depth. For other than plow-depth (as under deep, reduced, or no-tillage conditions), multiply the recommended rate of calcium carbonate by one of the following factors:

Tillage System <sup>1</sup>	Depth of Incorporation (Inches)	Multiplying Factor <sup>2</sup>
Shallow Tillage—less than 6"	3 or less	.43
1) Disk only    3) Ridge plant	4	.57
2) TIM plant    4) No-till	5	.71
	6	.86
	6.75	.96
	7	1.00
	8	1.14
Deep Tillage—6" or deeper	9	1.29
1) Mold board plow	10	1.43
2) Chisel plow	11	1.57
	12 or more	1.71